

AIR WAR COLLEGE

AIR UNIVERSITY

ANALYSIS OF "ROLLOVER-PLUS"

AN ACQUISITION STRATEGY UNDEFINED

by

Alan T. Nacke
Lt Col, USAF

A RESEARCH REPORT SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE CURRICULUM

REQUIREMENT

Advisor: Colonel Thomas M. Wellman

MAXWELL AIR FORCE BASE, ALABAMA

April 1994

Accession For	
NTIS	CRA&I <input checked="checked" type="checkbox"/>
DTIC	TAB <input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution /	
Availability	
Dist	Avail and/or Special
A-1	

DISCLAIMER

This study represents the views of the author and does not necessarily reflect the official opinion of the Air War College or the Department of the Air Force. In accordance with Air Force Regulation 110-8, it is not copyrighted, but is the property of the United States government.

Loan copies of this document may be obtained through the interlibrary loan desk of Air University Library, Maxwell Air Force Base, Alabama 36112-5564 (telephone [205] 953-7223 or DSN 493-7223).

ABSTRACT

Title: Analysis of "Rollover-Plus"...An Acquisition Strategy Undefined

Author: Alan T. Nacke, Lieutenant Colonel, USAF

The Defense Department, under former Secretary of Defense Les Aspin began transitioning to a new strategy for weapons system acquisition. One pillar of the new approach, termed *Rollover-Plus*, places heavy emphasis on the development and testing of high-fidelity prototypes—at times in lieu of production. Under *Rollover-Plus* it is envisioned that a small lot—perhaps a "mini-squadron"—of prototypes would be produced and flown. In theory, this will allow operators the chance to conduct operational testing and would provide developers insights into complex manufacturing producibility issues. After testing, the prototype, and associated technology gains, would most likely be "rolled-over" or "shelved" for incorporation into the next variant of the prototype. It is envisioned that perhaps only every third generation of a particular system might actually be fielded.

On the surface, this approach appears an affordable alternative to the frequent production runs of the past. Closer examination will show that the overall philosophy of *Rollover-Plus* is flawed, offering more benefits than it can deliver. Furthermore, *Rollover-Plus*, if implemented in its current form, will drive lengthy developments of expensive, overly-sophisticated prototypes, which will be impossible to put "on the shelf"—for political, economic, and military reasons. A few cycles of *Rollover-Plus* could truly give the acquisition community the appearance of being no more than a "technology hobby shop."

The solution is to implement a scaled-down version of rollover, based on the more traditional uses of prototypes as research and development tools, and NOT require them to be designed to withstand the rigors of operational testing.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Alan T. Nacke is a Command Pilot with more than 3,500 flying hours in the F-15, F-5E, and T-38 aircraft. He has had operational tours in the F-15 in TAC, PACAF, and USAFE, as well as one tour with the 64th Aggressor Squadron at Nellis AFB, NV. His staff experience was with the Air Force Operational Test and Evaluation Center, Kirtland AFB, NM, where he served as Test Director, OT&E, for the Advanced Tactical Fighter. Lt Col Nacke is a 1973 graduate of the US Air Force Academy, and has a Masters Degree in Systems Management (University of Southern California, 1981) and a Masters Degree in Aeronautical and Astronautical Engineering (Stanford University, 1987). He is a member of the Air War College Class of 1994.

TABLE OF CONTENTS

DISCLAIMER	ii
ABSTRACT	iii
BIOGRAPHICAL SKETCH	iv
Introduction	1
The Personalities	1
The New Strategy	2
The Role of Prototyping	4
Secretary Aspin on Rollover-Plus	5
In Summary—Strengths of Rollover-Plus	7
So What is the Problem?	8
"Production Representative" Prototypes	9
Prototyping and the Advanced Tactical Fighter	9
Can We "Shelve" a "Production Representative" Prototype?	11
Prototyping and the JAST Program	12
Congressional Response	15
Industrys' Response	15
New Approach Shows Promise	17
Recommendation 1: Provide Program Stability	17
Recommendation 2: Delete the "Plus" from Rollover-Plus	18
Recommendations Applied to JAST	19
JAST Update	21
For the Future	22
Figure 1. The Acquisition Process	23
Bibliography	24

Introduction

The Department of Defense (DoD) is transitioning to a new strategy for weapons development. Fundamental to this strategy is an increased emphasis on prototypes in lieu of production. On the surface, the new strategy appears sound, offering the lure of significant cost savings. The foundation has been established, but unfortunately, details have yet to be adequately defined. As a result, it may well promise benefits it cannot produce. This study will recap the new strategy, analyze its strengths and weaknesses, and present recommendations for improvement.

The Personalities

In February 1992, Representative Les Aspin, then Chairman of the House Armed Services Committee, outlined a new acquisition approach tailored to the fiscal constraints of the post-Cold War environment. Upon confirmation as Secretary of Defense for the Clinton administration, he began implementing the new policy. Secretary Aspin's unexpected resignation in early 1994 led to the appointment of his former deputy, Dr. William J. Perry, as the new Secretary of Defense. Secretary Perry's performance will be closely monitored by the acquisition community, as he has an impressive array of acquisition reform credentials. Among his many accomplishments, he is perhaps best known for his membership on President Reagan's 1986 *Blue Ribbon Commission on Defense Management*, also referred to as the Packard Commission—Dr. Perry served as director of the commission's Acquisition Task Force.¹

¹ *A Quest For Excellence, Final Report to the President by the President's Blue Ribbon Commission on Defense Management*, June 1986, Chapter 3, p. 41.

Although this paper focuses on former Secretary Aspin, one would expect Secretary Perry to continue pursuing his predecessor's initiatives, as he was a strong proponent of them while serving as Aspin's deputy. [Note—before attributing too much to Secretaries Aspin or Perry, it is significant to note that many acquisition changes closely resembling the Aspin proposals had already been introduced by the Bush administration. Three pillars of the new strategy—greater reliance on prototypes during development, increased use of advanced technologies to upgrade existing weapon systems, and selective production of new systems—were outlined by former Defense Secretary Dick Cheney in January 1992, and were reiterated in a mid-1992 white paper by the Bush Administration.]²

The New Strategy

The strategy now being implemented by the Clinton Administration is based on the following four principles:

- (1) *Selective Upgrading*—to keep specified weapon platforms around longer, as in the case of the Multi-Staged Improvement Program (MSIP) F-15C. This concept would allow older systems to benefit from advances in technology associated with newer or developmental systems. The upgraded system would increase not only its combat effectiveness but also its suitability. By incorporating state-of-the art avionics and other components, the older generation systems would become more reliable, maintainable, and supportable.

² Bush Administration White Paper entitled, "The Revised DoD Acquisition Approach -- Putting it to Work," May 1992.

(2) *Selective Low-Rate Procurement*—to be used when upgrades are no longer considered sufficient, and to keep the industrial base intact during longer intervals between new major weapon program starts. The long-term "block approach" to F-16 production illustrates this low-rate approach. In addition, low-rate production is envisioned as the "norm" from now on, as opposed to the traditional approach to procurement, whereby an initial low-rate production run would be followed by accelerated output during high-rate production.

(3) *Silver Bullet Procurements*—to produce a highly capable system when it is determined that it could provide a high-tech advantage or leverage on the battlefield. The F-117 program is the one that most often comes to mind when discussing the silver bullet concept. Another candidate which could become the next silver bullet is the V-22 Osprey. As envisioned by the Marine Corps, the V-22 could produce revolutionary changes in employment doctrine, providing combat capabilities never before available from either fixed-wing or rotary-wing aircraft.

(4) *Rollover-Plus*—to place increased emphasis on prototyping between less frequent major program starts.³ There are currently no examples of acquisition programs employing the *Rollover-Plus* strategy, which will be analyzed in detail in the remainder of this paper.

³ Representative Les Aspin's 1992 speech entitled, "Finding the Right Resource Strategy."

The Role of Prototyping

The first three principles are not new—nor is the concept of prototyping. The use of prototypes in weapons development offers many benefits: risk reduction, design validation, and system integration, to name but a few. Prototyping was instrumental in the F-16 source selection decision (YF-16/YF-17 flyoff);⁴ it also played a key role in development of the A-10 attack plane, under David Packard's "fly before you buy" policy.⁵ In a more recent effort, prototyping helped validate new technologies and reduce risk in the Advanced Tactical Fighter (ATF) Program.⁶

Dr. William Perry touted prototyping as a way of using technology to reduce cost in his 1986 "Formula for Action." Perry's Acquisition Task Force further recommended that not only should prototyping be done for all major weapon systems, but these prototypes should be subjected to operational and developmental testing *before* proceeding into full-scale development.⁷ To reiterate, prototyping is *not* a new concept.

What is new in the Aspin proposal is his vision of prototypes as "end products," in contrast to their conventional role as one of the many tools in the development of a major system. In this respect, *Rollover-Plus* represents a significant departure from the traditional approach to acquisition.⁸

At first glance, an increased emphasis on prototyping appears to be an attractive option. As mentioned above, the benefits can be great and it can play

⁴ Erik R. Pages, "The New Prototyping Strategy: Evidence and Prospects," *Defense Analysis*, Vol. 8, No. 3, 1992, pp. 313-315.

⁵ Murray Weidenbaum, *Small Wars, Big Defense*, (Oxford University Press, 1992) p. 171.

⁶ John D. Morrocco, "Lockheed ATF Team Cites Lessons Learned in Prototyping Effort," *Aviation Week & Space Technology*, November 5, 1990, p. 87.

⁷ *A Quest For Excellence*, Chapter 3, pp. 55-56.

⁸ Pages, 313.

a significant role—prototyping has literally meant the difference between success and failure in more than one program. The concept of *Rollover-Plus*, which advocates prototyping *in lieu of production* remains another story entirely. The reason—the strategy has yet to be adequately defined. *Rollover-Plus* can be interpreted in any number of ways, offering a host of implied promises which may prove undeliverable. Until it is precisely defined—within the context of the acquisition life cycle—the acquisition community is being asked to operate in an environment of uncertainty. The results could be unfulfilled expectations for all parties involved: insufficient incentives (profits) for industry, inadequate “fieldable prototypes” for operators and testers, and little operational high-tech hardware for Congress to parade before the taxpayers, to mention a few.

Secretary Aspin on *Rollover-Plus*

Exactly what were Secretary Aspin's expectations for *Rollover-Plus*? His position is summarized in this condensation of his February 1992 speech:

Our current system for developing and fielding advanced systems is no longer sustainable. We don't have the threat to counter and we don't have the money to do it, anyway. The replacement is “Rollover-Plus”...First, there's the rollover part of the system. Here, we would continue to prototype new systems and components but not put them into production until stringent criteria are met: (a) the technology works, (b) the system is required by the threat, or (c) it represents a breakthrough that would alter battlefield operations. Next, there's the manufacturing technology and operational testing. They are the new active ingredients in “Rollover-Plus”...it would

require the resultant prototype to be "production representative," and would thoroughly test prototypes of promising technologies and systems in an operational context. Traditionally, prototypes have been developed to provide a range of information: to resolve technical questions about new technologies, provide insights into a system's layout, and to test integration into a system. "Traditional" prototypes, therefore, have been developed primarily to understand *technical performance* issues. Although the resolution of technical performance issues is a key of any prototyping strategy, our "prototyping plus" strategy incorporates two additional objectives: *manufacturing producibility* and the resolution of *operational performance* issues.⁹

The Aspin plan calls for increased spending on prototypes and Advanced Technology Demonstrations (ATDs) at the expense of production. After a new system is developed, it will not automatically go into production; the technology will most likely be sent back to Milestone 0 and "rolled over" into an even newer generation system (see the diagram at Figure 1 of a major weapons system acquisition process). Secretary Aspin continues, "You will produce...maybe every third generation of planes."¹⁰ It has also been suggested that future prototypes may be produced in larger lots—a squadron of aircraft, for example—to fine-tune the manufacturing technology. Proponents have promoted this

⁹ Dr. Ernest A. Seglie quotes Mr Les Aspin in the article "The Ever-Current Issues in OT&E," *Program Manager*, September-October 1993, p. 31.

¹⁰ Peter Grier, "Another Run at the Acquisition Process," *Air Force Magazine*, June 1993, pp. 48-52.

approach as a way to keep production lines open¹¹ and put fieldable prototypes in the hands of operators for evaluation in realistic operational environments.¹²

In Summary—Strengths of *Rollover-Plus*

Steadily shrinking defense budgets combined with the lack of a recognized major threat have mandated changes in our approach to acquisition. *Rollover-Plus*, one pillar of the new Aspin strategy, was designed to address some specific concerns. First, the use of prototyping as an alternative to frequent program "new starts" will undoubtedly save money.

Second, if small lots of prototypes could support operational testing, the lessons learned could have far-reaching effects, extending well beyond obvious improvements for that particular system. As a hypothetical example, assume that the two YF-22 and YF-23 prototypes had achieved sufficient maturity to participate in a Green Flag exercise back in 1990. (Green Flag is a large air war flown in the Nellis Range Complex—an electronic warfare version of Red Flag.) Participation by these stealthy, high-speed, highly-maneuverable air superiority fighters would have undoubtedly provided a host of valuable findings: from the technical, to the tactical, and perhaps offering future operational and strategic doctrinal insights.

A third argument for *Rollover-Plus* is that it would enable producers to better understand complex manufacturing processes. This would certainly be true if "hard tooling" was developed to produce the small cadre of operational

¹¹ John D. Morocco, "Dangers Cited in Implementing New Pentagon Acquisition Strategy," *Aviation Week & Space Technology*, March 9, 1992, p. 21.

¹² Major William B. Vance, "Lean Production, A Focus for Defense Procurement Success," *Program Manager*, September-October 1993, p. 42. Author paraphrases comments made by former Defense Secretary Dick Cheney at a January 1992 press conference.

prototypes. ("Hard" tooling requires making the actual jigs, dies, and other unique tools needed to mass produce aircraft to extremely tight tolerances. In contrast, "soft" tooling implies a more individualistic, craftsman-like approach, best suited to building very low numbers of aircraft.) The experience gained from hard tooling would be directly transferable to any similar follow-on efforts.

Finally, consistent with the overall new acquisition strategy, prototypes developed to the standards demanded by *Rollover-Plus* could easily transition into either a *Silver Bullet* procurement or *Selective Low Rate* procurement program, the bulk of the work having already been accomplished.

So What is the Problem?

On the surface, *Rollover-Plus* appears to have merit. Pay contractors to produce a mini-squadron of relatively low-cost prototypes, test them operationally, refine manufacturing processes, and then either enter production, use technology to upgrade a current system, or put the technology "on the shelf" in a rollover. So what's the problem? A fundamental question, yet to be addressed is, "Exactly what are these prototypes that we will fund in lieu of 'full-up' weapons systems?" Historically, the term *prototype* has been used to describe anything short of a production vehicle. It could refer to a very immature ATD in the Concept Exploration Phase (before Milestone 1), a risk reducing test article in the Demonstration/Validation Phase (Dem/Val—before Milestone 2), or a high fidelity, "production representative/pre-production" system in the Engineering and Manufacturing Development Phase (EMD—before Milestone 3).¹³

¹³ Major Charles R. Nelson, "Keeping the Edge," *Program Manager*, January-February 1992, pp. 32-41.

"Production Representative" Prototypes

Secretary Aspin's comments demonstrate both his strong commitment to prototypes and his high expectations *from* prototypes. Based on his stated objectives of assessing *manufacturing producibility* and testing in an *operational context*, suitable prototypes would have to be, in the Secretary's own words, "production representative." (In the current acquisition framework, these requirements could only be satisfied by the family of highly sophisticated pre-production vehicles generally associated with the EMD phase, immediately preceding the Milestone 3 production decision.)

Prototyping and the Advanced Tactical Fighter

To better put things in perspective, it is useful to view prototyping in the context of a current program, such as the ATF. Unlike many DoD procurement horror stories, the ATF program has been heralded as a model program¹⁴, and serves as a good study in the use of prototyping. Full scale YF-22 and YF-23 prototypes first flew in the summer of 1990, during the program's Dem/Val phase. Sometimes incorrectly referred to as a "flyoff competition," prototypes in this phase were developed primarily to demonstrate certain critical characteristics and to reduce risk associated with this "leading edge of technology" program.¹⁵ It is interesting to note that little was actually demanded

¹⁴ Gregg Easterbrook, "The Real Lesson of the B-2," *Newsweek*, November 11, 1991, pp. 50-51. This article is typical of the type of praise that the ATF program, and its director, Gen Fain, have received both in the press and from members of the acquisition community.

¹⁵ John D. Morrocco, "Lockheed ATF Team Cites Lessons Learned in Prototyping Effort," p. 87.

of these Dem/Val aircraft; the sole contractual requirement for these vehicles was that they be able to take off.¹⁶

The Dem/Val stage for the YF-22 and YF-23 prototypes cost the Air Force more than \$5.2 billion; the cost for each prime contractor approached \$1.5 billion.¹⁷ Had this program been a candidate for *Rollover-Plus*, would the four prototypes which were built and flown have fulfilled Secretary Aspin's expectations as stated in *Rollover-Plus*? The answer is a resounding NO! Although the planes outwardly resembled proposed operational variants, similarities to the production fighter ended there. These were custom made, one-of-a kind items, totally unsuitable for addressing the critical concerns of *manufacturing producibility*. Skilled machinists, electricians, and other craftsmen built many components and subassemblies by hand. They utilized methods and "soft" tooling which, in many cases, did not even resemble processes that would later be required to fabricate production fighters.¹⁸ In addition, the prototypes made extensive use of off-the-shelf systems and avionics (the avionics suite considered by many to be the single biggest area of technical risk).¹⁹ Users desiring to see results of Operational Test and Evaluation (OT&E) would have been sorely disappointed—the prototypes possessed virtually no operational capability.

Had *Rollover-Plus* been around in late-1990, Congressmen (not to mention the media) might have asked, "More than \$8 billion and over four years have been invested in this program to date. If the YF-22 and YF-23 we now see flying

¹⁶ Easterbrook, pp. 50-51.

¹⁷ David A. Bond, "Clouded Threats, Lost Urgency Blur Debate on Defense Cuts," *Aviation Week & Space Technology*, March 16, 1992, p. 29.

¹⁸ John E. Jaquish, Lt Gen, USAF, transcript of testimony to the House Appropriations Committee, *Research, Development, Test and Evaluation, Air Force*, April 21, 1993, p. 251.

¹⁹ John D. Morrocco, "Lockheed Concentrates on F-22 Risk Reduction," *Aviation Week & Space Technology*, September 6, 1993, p. 50.

don't represent 'production representative' systems, how much will it take to get there?" The short answer would have been: at least another six years and another \$8 billion. As of March 1994, it has been more than three years since the first YF-22 flew; Lockheed has just now started construction on the first "production representative" F-22...it is not slated to fly until February 1997, assuming no further schedule slips. A total of nine F-22s will eventually be test flown during the EMD Phase.²⁰ Presumably, nine will be enough to gain sufficient operational testing in representative tactical scenarios.

The point of this entire ATF discussion is that even in model acquisition programs, "production representative" prototypes suitable for *operational testing* and for addressing *manufacturing producibility* concerns do not come quickly or cheaply. Developing sophisticated prototypes of the fidelity required, and in sufficient numbers to conduct operational and developmental testing, represents a much bigger undertaking than *Rollover-Plus* advocates might acknowledge.

Can We "Shelve" a "Production Representative" Prototype?

Unfortunately, the scenario above raises a myriad of concerns and surfaces some glaring disconnects. Given the costs and complexities of developing "production representative" prototypes, at what point—and by what criteria—will future "go" decisions be made? This prototyping commitment will assume major importance, analogous to a major milestone decision in the present system. Once committing to produce a modest number of "production representative" prototypes, have we not, in effect, already declared the program a *Silver Bullet*? One could easily envision successful prototypes proceeding to *selective low-rate*

²⁰ *Ibid.*

production. But could we realistically expect to "shelve" an investment comparable in magnitude to nine "pre-production" F-22s? And, assuming the decision is made to "shelve" such a project, is it reasonable to believe that the technology—already five to ten years in development—will not become obsolete before it can be rolled over into the next generation of prototype?

Mr LeRoy Haugh, of Aerospace Industries Association (AIA) comments, "The shelf life of technology is not very long, and it may not be possible to keep a design on hold unless there is at least some limited production to demonstrate feasibility."²¹ Mr Roger Ramseier, president of GenCorp's Aerojet Aerospace Division, has similar thoughts on rollover, "I can't imagine a product that could be put on a shelf and then just produced at a later date."²²

Prototyping and the JAST Program

Further evidence of the new strategy's shortcomings is exemplified in the Joint Advanced Strike Technology (JAST) Program. This initiative, an outgrowth of the Bottom-Up Review, could be considered the first major weapon system "new start" under the Aspin-Perry regime.²³ With cancellations of the A-12 (stealthy A-6 replacement), the A/F-X (stealthy long-range attack fighter), and the multirole fighter (F-18 replacement), the JAST Program represents DoD's hope for developing a future strike fighter. General John "Mike" Loh, Commander of Air Combat Command, characterizes the ultimate product of JAST as an F-16 replacement for the Air Force, an A-6 and F/A-18 replacement

²¹ David Hughes, "Use of Consultants Grows as Industry Restructures," *Aviation Week & Space Technology*, January 4, 1993, pp. 58-60.

²² Amy Bonus and James E. Ellis, "A Life Raft for Arms Makers," *Business Week*, March 16, 1992, pp. 122-124.

²³ David A. Fulghum and John D. Morrocco, "Bottom-Up Review Urges Modular Air Approach," *Aviation Week & Space Technology*, September 6, 1993, p. 27.

for the Navy, and an export aircraft to compete with France's Mirage and Russia's MiG fighters on the international market.²⁴ According to Secretary Aspin, the JAST initiative will focus on three areas: (1) building and flying a research and development (R&D) aircraft to demonstrate new technology, (2) developing new advanced precision-guided munitions (PGMs), and (3) maximizing commonality between eventual Air Force and Navy variants. From the Secretary's comments, it appears a foregone conclusion that a JAST prototype will fly, even though it is acknowledged that different requirements will likely result in different airframes for the Navy and Air Force (with a goal of maximizing common subsystems). There also appears to be some momentum to fly a JAST prototype soon; the Advanced Research Projects Agency (ARPA) proposal suggests flying JAST prototypes within four years, while General Loh implies flying could be possible by the end of the decade.²⁵ To further confuse the issue, Under Secretary of Defense for Acquisition John M. Deutch ruled out any such notion, stating that no prototypes could be built by then.²⁶ He is unquestionably well placed to influence any such decision; not only has he been the Pentagon's acquisition chief, but he has since been confirmed by the Senate to serve as Secretary Perry's deputy.²⁷

Within the context of the new acquisition strategy, exactly what would be the purpose of developing a JAST prototype, and is it consistent to commit to a flying prototype at this time? Some feel that Secretary Aspin's declaration to build flying prototypes was designed to ease industry fears that JAST will focus

²⁴ "JAST Should Use F-22, B-2 Technologies to Fly Early Prototypes, Loh Says," *Defense Daily*, November 3, 1993, p. 177.

²⁵ Defense Secretary Les Aspin, September 15, 1993 prepared remarks to the Air Force Association annual national convention entitled, "Future Effective, Affordable Air Power Plans," *Defense Issues*, Vol. 8, No. 59.

²⁶ Steven Watkins, *Air Force Times*, January 3, 1994, p. 34.

²⁷ Paul Quinn-Judge, *Boston Globe*, March 11, 1994, p. 6.

on component technology development, and not on airframe development and manufacturing.²⁸ His apparent commitment to a new airframe for the R&D effort seems misdirected—or at least premature—in light of the fact that eventual designs may have final forms considerably different from any R&D prototypes. It is difficult to imagine that many airframe manufacturing lessons could be drawn from such an effort. In contrast to former Secretary Aspin's position, neither Secretary Perry nor Deputy Secretary Deutch have stated their positions on whether or not JAST prototypes should even be built.²⁹

General Loh, on the other hand, is on record stating that JAST should focus primarily on building advanced prototypes using technologies already available in the F-22 and B-2 programs.³⁰ From his comments, one could envision perhaps a modified F-22, F-15, or other suitable existing airframe, as a flying testbed for new munitions, avionics, and components. Promising technologies and systems would ultimately evolve into common components incorporated into service-unique designs. While this more moderate approach appears to have merit, it represents but one senior officer's thoughts on how the program should be structured. The real bottom line was well articulated by General Loh when he stated, "We need to define this program—its goal and what tangible products it will produce. If we don't [do so] right up front, it has a great possibility of becoming a perpetual unfocused technology hobby shop...that produces little of value at the end of the day."³¹

²⁸ "Aspin Says JAST Prototypes Will Fly," *Aviation Week & Space Technology*, September 20, 1993, p. 33.

²⁹ "Loh Wants JAST Prototype Within Six to Eight Years," *Defense Daily*, February 23, 1994, p. 282.

³⁰ Aspin, September 15, 1993 remarks.

³¹ Theresa Hitchens and Robert Holzer, "2 Months Later, JAST Remain Ill Defined," *Defense News*, 15-21 November 1993, p. 4.

Congressional Response

This somewhat critical commentary on JAST is probably more fairly directed at the overall policy of *Rollover-Plus*. JAST's initial lack of direction is not surprising as it mirrors that of a suspect acquisition strategy. The result has been early disenchantment both in Congress and in the defense industry. Pentagon acquisition chief John Deutch requested that \$50 million be budgeted to begin JAST work in FY94. A skeptical Congress responded with a \$30 million appropriations bill. The corresponding authorizations conference provided no funds, calling the program, "vague, unchanneled and ill-defined." Congress apparently desired to steer away from overemphasizing commonality, which one staffer labeled, "a catalog of common parts with no end item." In the end, JAST supporters prevailed; \$29.7 million was awarded for program start in FY 94, almost equally divided between government and industry.³² The final conference report from Congress ended up as an indictment of Secretary Aspin's entire *Rollover-Plus* strategy, stating, "...the technology rollover [approach threatens to create a] science fair project that has no hope of yielding any fully integrated aircraft for more than 20 years."³³

Industrys' Response

Like Congress, industry has shown signs of dissatisfaction with the early direction of JAST. In an unprecedented move, Grumman Corporation, a naval aircraft builder for over 50 years, announced in October 1993 that they were

³² "JAST Schedule Calls for EMD by 2000," *Defense Daily*, February 24, 1994, p. 290.

³³ John D. Morrocco, "Congress Leaves JAST, C-17 Funding Quandaries," *Aviation Week & Space Technology*, November 22, 1993, p. 34.

leaving the advanced aircraft design business. Ambiguous signals from the Clinton Administration led them to the conclusion that JAST did not represent a profitable venture for near-term business. A Grumman spokesman stated, "With no new advanced tactical aircraft on the horizon, it is not cost-effective to keep the facilities around until [those future opportunities] materialize." Even Lockheed, arguably at the top of the pack, viewed JAST with skepticism. Tom Burbage, a Lockheed vice president, stated, "I would not expect to see industry put very much funding into JAST until someone defines what kind of opportunity it is. Is it an actual aircraft or only a technology opportunity?"³⁴ Even after a February 22, 1994 briefing to industry by Maj Gen George K. Muellner, JAST program manager, some in industry were apparently still not satisfied. Two industry officials stated that the briefing still did not provide industry with explicit and detailed guidance concerning the direction and destination of the program, which they viewed as the briefing's principal motivation.³⁵

The JAST program lacks enthusiastic support not because it is unnecessary or lacking in merit—JAST is under attack largely because it is a product of an acquisition strategy undefined. Is JAST envisioned as our next *Silver Bullet*, a candidate for *Selective Low-Rate Procurement*, or will it simply be a technology demonstrator destined for *Rollover*? Not even the administration's top acquisition officials appear eager to resolve the issue. If JAST, our newest acquisition endeavor, is representative of the administration's new strategy, there is little doubt why neither industry, nor Congress, is overly eager to invest in this uncertain environment.

³⁴ Hitchens, 4.

³⁵ *Defense Daily*, February 24, 1994, p. 290.

New Approach Shows Promise

Although this study has highlighted some of the shortfalls of the new strategy, it is not true that the overall approach is flawed. A drastically reduced defense budget has mandated major fundamental changes in this country's approach to acquisition. The Aspin policy concerning *Silver Bullets*, *Selective Low-Rate Procurement*, and *Selective Upgrading* is right on track. These concepts make sense, and offer possibilities for enhanced combat capability at an affordable price. *Rollover-Plus* is clearly the "weak link" of the new strategy, but it is not beyond repair. Two recommendations follow for correcting the shortfalls of *Rollover-Plus*.

Recommendation 1: Provide Program Stability

For *Rollover-Plus* to be a workable option, it must offer a greater degree of stability for the acquisition community than it now affords. In fairness to industry, Congress, and implementing commands, the expected "end product" of a new program must be defined at the outset. For any given program, there should be no doubt as to whether DoD is pursuing a technology demonstrator, an upgrade to a present system, or a "full-up" new weapon system destined for production. This is not to say that a program's direction cannot be changed, once initiated; few would fault an acquisition system with the flexibility to cancel faltering programs or to expand the charter of exceptional ones. For example, the Fairchild T-46, which could not meet stated user requirements, was scrapped, and rightfully so, after preliminary testing revealed significant performance shortfalls. Conversely, promising prototype programs, like the Have Blue predecessor to the F-117, should be allowed to advance and grow if they

demonstrate an exceptional potential for producing technological breakthroughs or battlefield leverage. To provide stability and open lines of communication, the program office, the using commands (such as Air Combat Command), and the appropriate members of the scientific and R&D communities (labs, ARPA, and perhaps the contractors) need to interact as early as possible to develop possible courses of action for a program. This diverse group must work together to explore fundamental issues at the outset. The following are but a few of the contributions one would expect from this group: (1) from the user—defining requirements, desires, and need dates (What does the user expect from this undertaking?), (2) from the scientific/R&D community—outlining state-of-the-art technologies, and projections (in terms of time, cost, and feasibility) of pursuing various advanced technology options, (3) from the program office—an informed decision as to the program direction, level of effort, and expected end product.

The stability offered by this approach would be derived by injecting technological realism at the outset, allowing the user to be fully involved from concept inception, and letting contractors fully appreciate what they might be getting involved with. In addition to these benefits, the program office would avoid the damaging perception of creating an "open-ended science project."

Recommendation 2: Delete the "Plus" from *Rollover-Plus*

As previously stated, adding the "Plus" to the rollover concept carries serious ramifications. Since the prototype *will* be viewed in terms of *manufacturing producibility* and it *will* be subjected to OT&E, this strategy of *Rollover-Plus*, by definition, drives the development of sophisticated, high-fidelity prototypes.

It should be quite apparent from the ATF case that the Defense Department simply cannot afford such levels of effort very often. It is almost inconceivable

that the Pentagon would embrace the building of a mini-squadron of production representative prototypes, with the expressed intent of "shelving" them at the conclusion of OT&E.

If the intent is, as Aspin has stated, to actually produce only every third generation of a particular system, it follows that the level of effort for the rollover versions should be scaled back considerably. These first and second generation prototypes would be oriented toward specific technical objectives, but would *not* be built with production "hard" tooling processes and would *not* be subjected to OT&E.

Deleting these expensive, program-driving requirements inherent in the "Plus" of *Rollover-Plus* is the only pragmatic way of utilizing a rollover approach to acquisition.

Recommendations Applied to JAST

How might these recommendations be applied to a "real world" program, such as JAST? Three suggestions follow, with hypothetical guidance as it might relate to JAST. Note that relatively specific guidelines are offered with respect to two important aspects: (1) defining prototyping efforts, and (2) identifying the anticipated point in the program where a *Rollover* would occur.

- (1) First, the expected "end product" must be articulated to the best of DoD's ability (this is one thing that *has* been done to some degree). For example, "DoD envisions JAST as a medium range, stealthy, interdiction fighter which might be characterized as a futuristic F-15E, F-111, or A-6. Lean production runs of 36 aircraft per year are anticipated beginning in 2006, resulting in a total of 360 aircraft by 2016. Air Force and Navy

airframes may vary considerably, but maximizing common components and subsystems will be emphasized throughout the program."

(2) Second, expectations from early phases must be more precisely outlined.

This allows contractors to know "what they are getting in to" and outlines potential opportunities for additional contractor incentives. *Rollovers* should not come as a surprise. For example, "Munitions, subsystems, components, and avionics will be developed to support JAST flight testing in 1999. The test vehicle will be an existing airframe modified to incorporate the new systems. Promising technologies will be rolled-over into the final design. The program office will conduct a source selection following this phase, downselecting to one prime contractor to continue toward production. Proposals for use of new technologies to upgrade current systems are solicited. Promising upgrades will be chosen on their merits, independent of the JAST downselect decision."

(3) Third, major prototype efforts must be defined. For example, "An initial lot of 8 Air Force and 8 Navy JAST pre-production vehicles will be developed in 2004 to support operational and developmental testing, and for the purpose of optimizing manufacturing processes. These vehicles will be 'production representative' to the maximum extent possible."

Admittedly, these statements represent a gross oversimplification of a complex process, but they suggest the type of direction that both Congress and industry seem to be grasping for. Program stability is increased, premature OT&E is obviated, prototyping levels of effort are defined, and the final, fieldable system is described.

JAST Update

In defense of JAST, considerable strides have been made since the initial Congressional criticisms in late 1993. Program manager, Maj Gen Muellner, recently announced an overall acquisition strategy that uses portions of the Aspin plan, but wisely, does *not* incorporate *Rollover-Plus*.

His strategy could most closely be likened to the Have Blue/F-117 effort, whereby a relatively immature prototype demonstrated proof of concept, followed by a rapid transition into production. For JAST, two prototypes—termed Advanced Aircraft Concept "X" and "Y"—will be built and flown with a planned hand-off to EMD around the year 2000. Late maturing JAST technologies could conceivably help lower costs and increase combat capabilities of the F-22 and F/A-18E/F. One JAST initiative sure to pay big dividends is described by Gen Muellner, "We're putting the users and technologists in a room and allowing them to develop their products simultaneously. That way the user...understands what the costs of his decisions are."³⁶ Gen Muellner appears keenly aware of the need to produce a product, "We can't go out and waste \$2 billion of the department's money and not get products out...We do not want to become or likened to the image of SDIO [the Strategic Defense Initiative Organization]."³⁷

It appears that JAST is proceeding in a prudent manner. A key decision yet to be made concerns the defining of the game plan for the two prototypes. Some apparently unresolved questions involving the prototypes follow. Will one be an advanced short takeoff/vertical landing (ASTOVL) variant? Does prototype "X" represent a USAF variant and "Y" a Navy variant? (Recall that USAF and USN

³⁶ David A. Fulghum, "JAST Plan Envisions ASTOVL Prototype," *Aviation Week & Space Technology*, February 28, 1994, p. 30.

³⁷ Tony Capaccio, "Joint Aircraft Program Strives To Avoid 'McNamara's Folly'," *Defense Week*, February 28, 1994, p. 15.

final products could look quite different.) Are "X" and "Y" generic proposals by different prime contractors that could evolve into a USAF-X and a USN-X?

Where in the program is an anticipated source selection? Could USAF and USN variants be built by different contractors?

For the Future

In the future, drastic changes to an acquisition program—such as unexpected rollovers or silver bullet declarations—should be the exception, and not the rule. Poorly defined, open-ended projects cannot expect much support, either in terms of Congressional funding, public acceptance, or industry participation. In many major acquisition programs, private corporations invest many of their own funds during development, in hopes of making a profit during production. A defense contractor who has been working in good faith to field such a system—only to be awarded a *"Rollover-Plus* booby prize"—will not likely be amused (nor will his company be easily persuaded to pursue follow-on DoD ventures). For this reason, the rules of the new acquisition game must be defined up front.

Finally, the acquisition strategy of *Rollover-Plus* must be scrapped now. More specifically, it must be precisely redefined *without* the "Plus," which unnecessarily drives both premature OT&E, and the questionable practice of routine development of costly "production representative" prototypes. Only after dropping the "Plus" will a *Rollover* approach to acquisition be an affordable, rational complement to the other three pillars of the Aspin acquisition plan: *Selective Upgrading, Selective Low-rate Procurement, and Silver Bullet Production.*

ACQUISITION MILESTONES AND PHASES

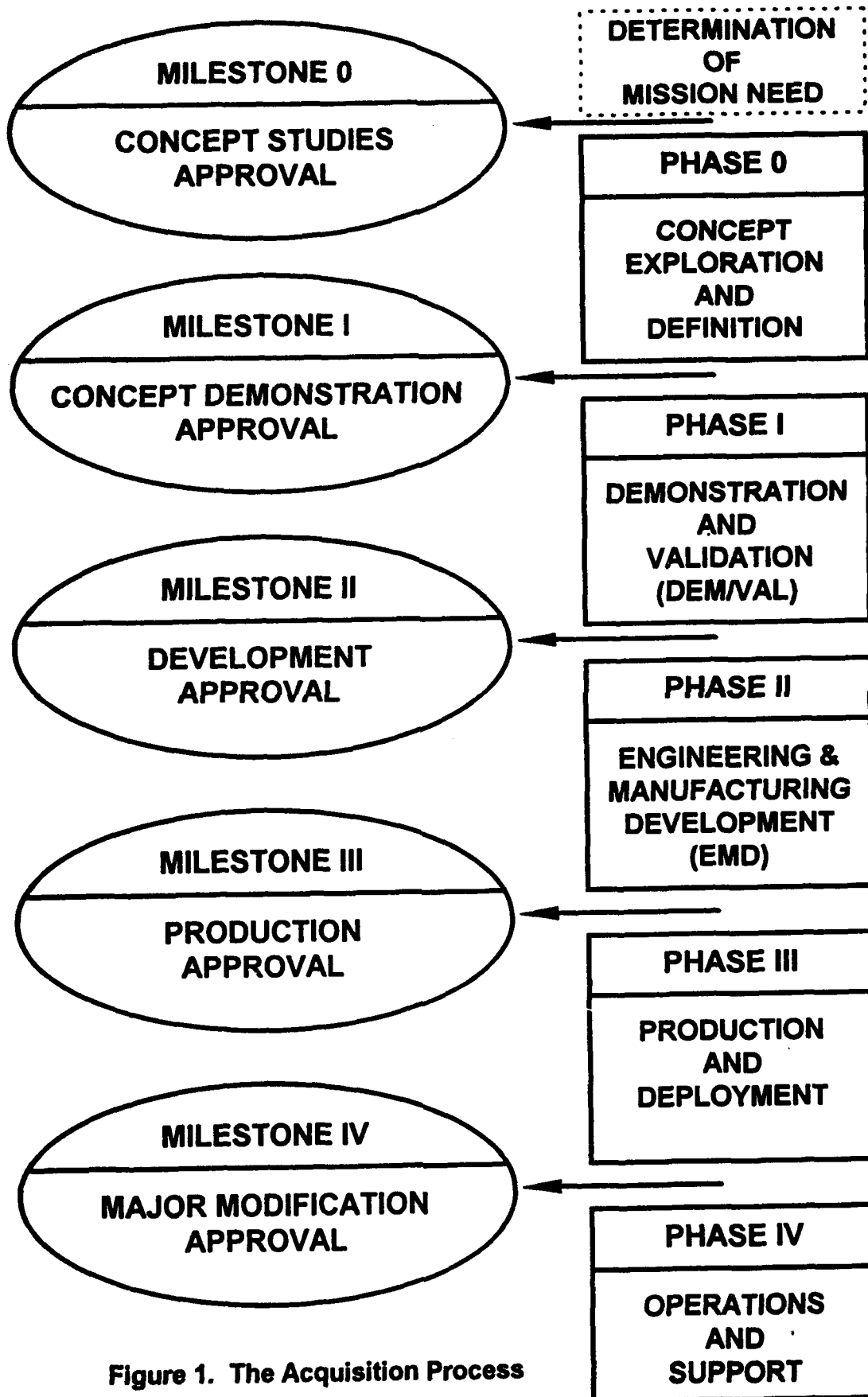


Figure 1. The Acquisition Process

BIBLIOGRAPHY

- A Quest For Excellence*, Final Report to the President by the President's Blue Ribbon Commission on Defense Management, June 1986.**
- Aspin, Les.** Representative Les Aspin's 1992 speech entitled, "Finding the Right Resource Strategy."
- "Aspin Says JAST Prototypes Will Fly,"** *Aviation Week & Space Technology*, September 20, 1993.
- Aspin, Les.** Defense Secretary Les Aspin, September 15, 1993 prepared remarks to the Air Force Association annual national convention entitled, "Future Effective, Affordable Air Power Plans," *Defense Issues*, Vol. 8, No. 59.
- Bond, David A.** "Clouded Threats, Lost Urgency Blur Debate on Defense Cuts," *Aviation Week & Space Technology*, March 16, 1992.
- Borrus, Amy and Ellis, James E.** "A Life Raft for Arms Makers," *Business Week*, March 16, 1992.
- Bush, George.** Bush Administration White Paper entitled, "The Revised DoD Acquisition Approach -- Putting it To Work," May 1992.
- Capaccio, Tony,** "Joint Aircraft Program Strives To Avoid 'McNamara's Folly'," *Defense Week*, February 28, 1994.
- Easterbrook, Gregg.** "The Real Lesson of the B-2," *Newsweek*, November 11, 1991.
- Fulghum, David A. and Morrocco, John D.** "Bottom-Up Review Urges Modular Air Approach," *Aviation Week & Space Technology*, September 6, 1993.
- Fulghum, David A.** "JAST Plan Envisions ASTOVL Prototype," *Aviation Week & Space Technology*, February 28, 1994.
- Grier, Peter.** "Another Run at the Acquisition Process," *Air Force Magazine*, June 1993.
- Hitchens, Theresa and Holzer, Robert.** "2 Months Later, JAST Remain Ill Defined," *Defense News*, 15-21 November 1993.
- Hughes, David.** "Use of Consultants Grows as Industry Restructures," *Aviation Week & Space Technology*, January 4, 1993.

Jaquish, John E., Lt Gen, USAF, transcript of testimony to the House Appropriations Committee, *Research, Development, Test and Evaluation, Air Force*, April 21, 1993.

"JAST Schedule Calls for EMD by 2000," *Defense Daily*, February 24, 1994.

"JAST Should Use F-22, B-2 Technologies to Fly Early Prototypes, Loh Says," *Defense Daily*, November 3, 1993.

"Loh Wants JAST Prototype Within Six to Eight Years," *Defense Daily*, February 23, 1994.

Morocco, John D. "Lockheed Concentrates on F-22 Risk Reduction," *Aviation Week & Space Technology*, September 6, 1993.

Morocco, John D. "Dangers Cited in Implementing New Pentagon Acquisition Strategy," *Aviation Week & Space Technology*, March 9, 1992.

Morocco, John D. "Lockheed ATF Team Cites Lessons Learned in Prototyping Effort," *Aviation Week & Space Technology*, November 5, 1990.

Morocco, John D. "Congress Leaves JAST, C-17 Funding Quandaries," *Aviation Week & Space Technology*, November 22, 1993.

Nelson, Major Charles R. "Keeping the Edge," *Program Manager*, January-February 1992.

Pages, Erik R. "The New Prototyping Strategy: Evidence and Prospects," *Defense Analysis*, Vol. 8, No. 3, 1992.

Weidenbaum, Murray. *Small Wars, Big Defense*, (Oxford University Press, 1992).

Quinn-Judge, Paul. *Boston Globe*, March 11, 1994.

Seglie, Dr. Ernest A. Quotes Mr Les Aspin in the article "The Ever-Current Issues in OT&E," *Program Manager*, September-October 1993.

Vance, Major William B. "Lean Production, A Focus for Defense Procurement Success," *Program Manager*, September-October 1993, p. 42. Author paraphrases comments made by former Defense Secretary Dick Cheney at a January 1992 press conference.

Watkins, Steven. *Air Force Times*, January 3, 1994.